

The inventor of the modern electron tube, and of many other contributions to radio during the last half century, here describes the upward course of radio and offers counsel, based on experience, to his fellow workers of today and to the government officials entrusted with present administrative responsibilities.

The eminent writer of the following guest editorial needs, and can have, no better introduction than to state that he is LEE DE FOREST.—*The Editor.*

A Half Century

LEE DE FOREST

To those of our membership whose professional, or amateur, radio activities span the completed half century, the glance backward from today's eminence of achievement must surely be accompanied by sentiments of wonder and admiration, not unmingled with some nostalgia.

From the crude experiments of Oliver Lodge and Marconi in wireless transmission over the first few miles, when even a wave-meter was unknown, to the spanning of the Atlantic, first with Morse signals, then with the human voice from Arlington to Paris and Honolulu, and on down the years to today's universal network of radio communication of every type and description, shrinking our globe to a mere basketball, the technical progress therein involved defies total comprehension.

With this crowded accomplishment, no organized mental achievement, through the age-long history of the evolving human brain, can successfully compare.

In 1900 our total applicable technical library comprised chiefly the works of Maxwell, Hertz, Tesla, J. J. Thompson, Poincare, and Lodge. The single journals containing an occasional article helpful to the then *Wireless Engineer* were *Wiedemann's Annalen* and the *Philosophical Magazine* of London.

Other than the lone experimenters themselves, few indeed glimpsed at first any commercial future for "Wireless." Even the Army and the Navy saw but small usefulness in our manifold efforts, employing alternating current transformers, self-restoring detectors and headphones, to excel the European pioneers with their still more primitive spark-coils, coherers, and tape recorders. Technical progress lagged shamelessly, tightly bound as we then were by the strait limitations of the open spark and arc transmitters. The quenched spark-gap of Max Wien and the electrolytic and crystal detectors were almost the sole instances of progress until entrance upon the scene of the three-element tube with plate supply, first as a far better detector, then as the long-awaited amplifier, poetically foretold forty years before by Professor's Hughes and Stokes—an "hour for which the years (and telephone engineers) did sigh."

As though in apt commemoration of the discovery of that promethean device, the Archimedian electronic lever, destined with feedback to move the world forward, our Institute of Radio Engineers was shortly thereafter established.

Its infant-sized PROCEEDINGS began forthwith to compete with Zenneck's *Jahrbuch der Drahtlos Telegraphie*, and was eagerly welcomed by those to whom German and Greek were essentially synonymous.

The demands and exigencies of World War I forced the swift development of the first watt oscillators into multi-kilowatt types which, with the power-modulation methods of Heising, thereafter made possible huge sponsored earnings by a theretofore virgin-pure radio broadcasting art—a sort of etheric prostitution new to mankind. So broadcasting for hire, like a surging epidemic, spread over the land. What untold tonnages of soap and so-forth were sold therewith; what hosts of otherwise undiscovered "talent" ranged and raged before our inoffensive microphones; what profound changes in our home life, in political destinies were thus unfolded! And what manifold new industries, whose swollen earnings have already totaled more than fifty billions, affording a million new jobs, have we seen founded upon, or grown great from, the electron tube!

Ensued then the regenerative and superhetrodyne receivers, entangled for years in historic patent litigation, even unto the Supreme Court, whereon the patent-lawyer fraternity fattened enormously. Simultaneously during the tumultuous 'twenties the amplifying branch of the fast spreading electronic tree blossomed beautifully into sound-on-film, perfected music recording-reproduction, and the oscillographic parent of television-realizations of the ancient dreams of Edison and of von Rosing.

Progress during the third decade of our half century may be generally classified as intensified investigation of atmospheric phenomena affecting transmission, the introduction of the electron to industry, rapid development of frequency modulation by Armstrong, and the beginnings of cathode-ray television made possible by the brilliant genius of Zworykin and Farnsworth. Our accumulated store of information and the practical applications thereof added up to immense basic values, forming a firm foundation for what the fighting 'forties were to require.

There the demoniacal demands of World War II, blacking out all cost figures, forced a dozen premature births, such as radar, sonar, the proximity fuze, remote-controlled missiles, and the electronic navigational aids that made possible today's congested aviation traffic.

Thus the present status of radio and electronics owes immeasurable debt to the two holocausts that have blackened the fair pages of the history of our first half-century.

Today's astounding public acceptance of television serves as a needed peacetime stimulation to yet swifter, more ennobling efforts. Happily there are indications that in (long overdue) time the cultural values beyond all estimation, innate in radio and television, will be realized by those to whom we engineers have had to entrust the commercial applications of the miracles so hopefully created; that eventually the advertiser's profit motive will cease to be the prime factor in the instrumentalities we have been busily introducing into the home-life of America. Assuming that Russia values her peaceful place in the sun, color video, now only nascent, will be our next great contribution to the richness of that home life.

But what in addition to this awaits our world during the ensuing half-century? What further multiple and benign activities await the electron, as undreamed of now as were those of today to the embryonic radio profession of fifty years ago?

These the fortunate chronicler of A.D. 2000 alone can tell.

As we survey the history of modern technological advancement the world over, we find nothing comparable with the past half-century's achievements of American industry, scientifically directed; and nothing in all that vast progress surpassing that of our own radio-electronic structure. Today while our national economy, so often tormented by ill-conceived political restrictions and exactions, presents a rapidly darkening picture, the brilliant record of our special industry and science stands out as a challenging example of the basic virtues of the principle of free enterprise. Let us all therefore highly resolve to keep that proven principle unhindered by the socialistic sophistries which now seek, leech-like, to suck the life blood from our American capitalist system.

That the record of the next half-century be no less glorious than that of the epoch now ending.